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Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION
TRANSMITTAL**

(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))

Attorney Docket No. **QUA 1844.08A**
First Inventor or Application Identifier **PATRICK H. DWYER**
Title **DUAL CAMERA MOUNT FOR STEREO IMAGING**
Express Mail Label No. **EJ 033542225US****APPLICATION ELEMENTS**

See MPEP chapter 600 concerning utility patent application contents.

1. ☒ * Fee Transmittal Form (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
2. ☒ Specification [Total Pages **16**]
(preferred arrangement set forth below)
- Descriptive title of the invention
- Cross References to Related Applications
- Statement Regarding Fed sponsored R & D
- Reference to Microfiche Appendix
- Background of the invention
- Brief Summary of the invention
- Brief Description of the Drawings (if filed)
- Detailed Description
- Claim(s)
- Abstract of the Disclosure
3. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets **6**]
4. Oath or Declaration [Total Pages **1**]
a. ☒ Newly executed (original or copy)
b. ☐ Copy from a prior application (37 C.F.R. § 1.63(d))
(for continuation/divisional with Box 16 completed)
i. ☐ **DELETION OF INVENTOR(S)**
Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).

NOTE FOR ITEMS 1 & 13: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).**ADDRESS TO:**Assistant Commissioner for Patents
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Washington, DC 20231

5. ☐ Microfiche Computer Program (Appendix)
6. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
a. ☐ Computer Readable Copy
b. ☐ Paper Copy (identical to computer copy)
c. ☐ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

7. ☒ Assignment Papers (cover sheet & document(s))
8. ☐ 37 C.F.R. § 3.73(b) Statement of Power of Attorney (when there is an assignee)
9. ☐ English Translation Document (if applicable)
10. ☐ Information Disclosure Statement (IDS)/PTO-1449 [Copies of IDS Citations]
11. ☐ Preliminary Amendment
12. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
13. ☒ * Small Entity Statement(s) [Statement filed in prior application, Status still proper and desired] (PTO/SB/09-12)
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☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No: _____
Prior application information: Examiner _____ Group / Art Unit: _____

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17. CORRESPONDENCE ADDRESS☐ Customer Number or Bar Code Label

(Insert Customer No. or Attach bar code label here)

or ☒ Correspondence address below

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Country **USA** Telephone **530 432 5285** Fax **530 432 5439**

Name (Print/Type) **PATRICK H. DWYER** Registration No. (Attorney/Agent) _____
Signature **Patrick H. Dwyer** Date **6/6/2000**

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TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number		
	Filing Date		
	First Named Inventor	Patrick H. Dwyer	
	Group Art Unit		
	Examiner Name		
Total Number of Pages in This Submission	4	Attorney Docket Number	QUA1844.08A

ENCLOSURES (check all that apply)		
<input checked="" type="checkbox"/> Fee Transmittal Form <input checked="" type="checkbox"/> Fee Attached <input type="checkbox"/> Amendment / Response <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts/Incomplete Application <input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53	<input checked="" type="checkbox"/> Assignment Papers (for an Application) <input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition Routing Slip (PTO/SB/69) and Accompanying Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Small Entity Statement <input type="checkbox"/> Request for Refund	<input type="checkbox"/> After Allowance Communication to Group <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input type="checkbox"/> Additional Enclosure(s) (please identify below): <div></div>
Remarks		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT	
Firm or Individual name	Aim Controls, Inc., Patrick H. Dwyer, CEO
Signature	Patrick H. Dwyer, CEO
Date	6/6/2000

CERTIFICATE OF MAILING			
I hereby certify that this correspondence is being deposited with the United States Postal Service as EXPRESS first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on this date: 6/6/2000			
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Signature	Patrick H. Dwyer	Date	6/6/2000

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**STATEMENT CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) & 1.27(b))--INDEPENDENT INVENTOR**

Docket Number (Optional)

QVA1844.08A

Applicant, Patentee, or Identifier: Patrick H. Dwyer

Application or Patent No.: _____

Filed or Issued: _____

Title: DUAL CAMERA MOUNT FOR STEREO IMAGING

As a below named inventor, I hereby state that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees to the Patent and Trademark Office described in:

- ☒ the specification filed herewith with title as listed above.
☐ the application identified above.
☐ the patent identified above.

I have not assigned, granted, conveyed, or licensed, and am under no obligation under contract or law to assign, grant, convey, or license, any rights in the invention to any person who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern, or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- ☐ No such person, concern, or organization exists.
☒ Each such person, concern, or organization is listed below.

Aim Controls, Inc.
10138 COMMERCIAL AVENUE
PENN VALLEY, CA 95946

Separate statements are required from each named person, concern, or organization having rights to the invention stating their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

Patrick H. Dwyer Gordon R. Southan
NAME OF INVENTOR NAME OF INVENTOR

Patrick H. Dwyer Gordon R. Southan
Signature of inventor Signature of inventor

6/6/2000
Date

6/6/2000
Date

NAME OF INVENTOR

Signature of inventor

Date

**STATEMENT CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) & 1.27(c))--SMALL BUSINESS CONCERN**

Docket Number (Optional)
QUA1844.08A

Applicant, Patentee, or Identifier: Patrick H. Dwyer
Application or Patent No.: _____
Filed or Issued: _____
Title: DUAL CAMERA MOUNT FOR STEREO IMAGING

I hereby state that I am
☒ the owner of the small business concern identified below:
☐ an official of the small business concern empowered to act on behalf of the concern identified below

NAME OF SMALL BUSINESS CONCERN Aim Controls, Inc.

ADDRESS OF SMALL BUSINESS CONCERN 10138 COMMERCIAL AVENUE,
PENN VALLEY, CA. 95946

I hereby state that the above identified small business concern qualifies as a small business concern as defined in 13 CFR Part 121 for purposes of paying reduced fees to the United States Patent and Trademark Office. Questions related to size standards for a small business concern may be directed to: Small Business Administration, Size Standards Staff, 409 Third Street, SW, Washington, DC 20416.

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NAME OF PERSON SIGNING Patrick H. Dwyer
TITLE OF PERSON IF OTHER THAN OWNER CHIEF EXECUTIVE OFFICER
ADDRESS OF PERSON SIGNING 10138 COMMERCIAL AVE, PENN VALLEY, CA 95946
SIGNATURE Patrick H. Dwyer DATE 6/6/2000

TITLE OF THE INVENTION

DUAL CAMERA MOUNT FOR STEREO IMAGING

CROSS-REFERENCE TO RELATED APPLICATIONS

Not Applicable

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH

OR DEVELOPMENT

Not Applicable

REFERENCE TO A MICROFICHE APPENDIX

Not Applicable

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention pertains to a certain apparatus whereby a mount for two cameras for use in stereo imaging has controls for the convergence of the two cameras, adjustment of the position of the image plane in one camera with respect to the image plane in the other camera such that the two cameras are correctly focused on the same image, adjustment of the spacing between the two cameras such as to mimic the average distance between human eyes, and adjustment of the two cameras such that

the two cameras, while being converged, rotate around the same image (nodal) point.

The primary benefits of the present invention are a compact mechanical configuration, simple and precise control of the optical convergence of two cameras, simple and precise alignment of the image plane in one camera with respect to the image plane in the second camera, simple adjustment of the distance between the cameras to mimic the distance between human eyes, and simple adjustment of the image (nodal) point around which the cameras are rotated for convergence.

2. Description of the Background Art

A wide variety of camera mounts have been known and used since the beginning of the film and television industries. Almost all of these are designed for a single camera and two dimensional photography. A small number of camera mounts that hold two cameras simultaneously have been made for making three dimensional photographs, motion picture films and television shows, commonly referred to as "stereo graphic" or "3D" imaging. At least one such camera mount known to Applicant has a very coarse, manual adjustment of the convergence of the two camera's optical systems, but it is poorly designed and very difficult to use. To applicant's knowledge, no dual camera mount, of the design disclosed herein, has contained all of the following elements: (a) a convenient and accurate convergence adjustment mechanism; (b) the ability to precision adjust, in any dimension, the position of the image planes between the two cameras such that they were located at the same image focal plane and received the same image; (c) the ability to adjust the spacing between

the two cameras such as to mimic the average distance between human eyes; and (d) the ability to adjust the two cameras such that the two cameras, while being converged, rotate around the same image (nodal) point.

BRIEF SUMMARY OF THE INVENTION

The present invention consists of a mount for two cameras that provides a combination of precision convergence control and precision alignment of the image planes of two cameras for stereo graphic imaging. More particularly, it is an apparatus for precise control of the convergent focusing of two cameras and the fine adjustment of the position of the image plane in one camera with respect to the image plane in the other camera. This apparatus significantly improves the ability to make stereo graphic images by making the adjustment of camera convergence and the alignment of the image focal planes precise and simple.

One object of the invention is to combine into a single mount for two cameras a simple and precise control of the optical convergence of the two cameras.

Another object of the invention is to combine into a single mount for two cameras simple and precise alignment of the image focal plane in one camera with respect to the image focal plane in the second camera.

Another object of the invention is to combine into a single mount for two cameras simple means for adjustment of the distance between the two cameras to mimic the distance between human eyes.

Another object of the invention is to combine into a single mount for two cameras

simple means for adjustment of the image (nodal) point around which the cameras are rotated for convergence.

Further objects and advantages of the invention will be brought out in the following portions of the specification, wherein the detailed description is for the purpose of fully disclosing preferred embodiments of the invention without placing
5 limitations thereon.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be more fully understood by reference to the following drawings which are for illustrative purposes only:

FIG. 1 shows an exploded, isometric view of a complete, two camera mount with integral worm gear convergence control with electric motor drive, precision image focal
10 plane adjustment mechanism, and two example cameras;

FIG. 2 shows a front view of a complete, two camera mount with integral worm gear convergence control with electric motor drive, precision image focal plane adjustment mechanism, and two example cameras;

FIG. 3 shows a top view of a complete, two camera mount with integral worm gear convergence control with electric motor drive, precision image focal plane adjustment mechanism, and two example cameras;

FIG. 4 shows a side view of a complete, two camera mount with integral worm gear convergence control with electric motor drive, precision image focal plane
20 adjustment mechanism, and two example cameras.

FIG. 5 shows an exploded, close up isometric view of the precision image focal plane adjustment mechanism in the dual camera mount, and an example camera.

FIG. 6 shows simplified, conceptual, top down view of the dual camera mount demonstrating the precision convergence mechanism.

DETAILED DESCRIPTION OF THE INVENTION

5 Referring more specifically to the drawings, for illustrative purposes the invention is embodied in the apparatus generally shown in FIG. 1 through FIG. 6. It will be appreciated that the apparatus may vary as to configuration and as to details of the parts, and that the method may vary as to details and the order of the steps, without departing from the basic concepts as disclosed herein.

10 A. Convergence Adjustment

Referring to FIG 1, the dual camera convergence assembly is comprised of the base mounting plate 1, gear mount dovetail slides 2 and 3, worm gears 4 and 5, worm gear bearing assemblies 6 and 7, worm 8, camera mount dovetail slides 9 and 10, adjustable camera mounting bracket 11, fixed camera mounting bracket 12, image plane adjustment plate 13, and associated hardware as shown. Also shown is an
15 electric motor 14 to rotate the worm, a motor mounting bracket 15 to hold the electric motor, and two example cameras 16 and 17.

20 Figures 2 through 4 show, respectively, a front view, top view, and side view of the subject dual camera mount in an unexploded format. These figures are present to assist in the three dimensional interpretation of the Fig. 1 exploded isometric view of

applicant's invention.

The convergence assembly is designed to permit precision, synchronous rotation of cameras 16 and 17, which are positioned on the same optical plane, such that the line of sight of the optical systems of cameras 16 and 17 converge at the same distance from the image focal planes of cameras 16 and 17. The convergence of the two cameras 16 and 17 is controlled by the simultaneous and synchronous rotation of the two worm gears 4 and 5 by means of the rotation of worm 8, thereby adjusting the optical line of sight of cameras 16 and 17 to a single point of convergence at a desired distance. For example, referring to Fig. 6, rotating worm 8 in one direction rotates the worm gears 4 and 5 synchronously, thereby simultaneously rotating cameras 16 and 17 so that the line of sight of each camera converges (crosses the centerline) at 10 feet from the subject two camera mount. Referring again to Fig. 6, rotating worm 8 in the other direction results in the convergence of cameras 16 and 17 at 20 feet from the subject camera mount. By similar movement of worm 8, the convergence of the two cameras can be adjusted from a few inches to infinity.

Figures 1 and 6 and the foregoing discussion describe a preferred embodiment of a precision convergence adjustment mechanism between two cameras. Other mechanical components and varying mechanical configurations could be substituted for some of the specific mechanical components shown in applicant's drawings. For example, worm gears 4 and 5, along with worm 8, could be replaced by spur type gears, direct drive discs, or even pulley drives. However, the principle of operation of

the convergence adjustment mechanism would remain the same: the image focal planes (i.e., the optical line of sight) of cameras 16 and 17 are pointed at the same object at a given distance from the camera mount, such pointing being done by means of synchronized rotating devices to which the cameras 16 and 17 are affixed, and such synchronized rotating devices being simultaneously driven by a third, single rotating device that is manually or automatically turned in the desired direction.

B. Image Focal Plane Adjustment

Figure 5 shows a closeup of the precision image focal plane adjustment mechanism which is comprised of camera mounting bracket 11, image focal plane adjustment plate 13, example camera 16, spring 18, ball nose screws 19, 20, 21, and spherical depressions 22, 23, and 24. Camera mounting bracket 11 and image focal plane adjustment plate 13 are held together by the tension of spring 18, but kept some distance apart by the ball nose screws 19, 20, and 21.

Referring to Figure 6, the purpose of the image focal plane adjustment mechanism is to enable the precision alignment of the image focal planes 25 and 26 in example cameras 16 and 17 such that the two image focal planes 25 and 26 are at the same height, are at the same pitch angle, and are at the same roll angle with respect to base mounting plate 1.

The three ball nose screws 19, 20, and 21 intersect the effective plane of image focal plane adjustment plate 13 such that the effective plane of image focal plane adjustment plate 13 can be moved (as a plane) in pitch, roll and altitude. The yaw of

image focal plane adjustment plate 13 is fixed.

The seating of the ball nose screws 19, 20, and 21 in respective spherical depressions 22, 23, and 24 fixes yaw and prevents undesired lateral movement. By adjusting the length of ball nose screw 19 relative to ball nose screws 20 and 21, the pitch of image focal plane adjustment plate 13 is altered. By adjusting the length of ball nose screw 21 relative to ball nose screws 19 and 20, the roll of image focal plane adjustment plate 13 is altered. By adjusting the length of all three ball nose screws at the same time, the height of the image focal plane adjustment plate 13 is altered.

The movement of image focal plane adjustment plate 13 (as a plane) in pitch, roll and altitude enable the image plane of example camera 16 to be aligned to the image plane of example camera 17, which is in a fixed position by its fixed attachment to camera mounting bracket 12.

Figures 1 and 5 and the foregoing discussion show a preferred embodiment of a precision image plane adjustment mechanism between two cameras. Other mechanical components and varying mechanical configurations could be substituted for some of the specific mechanical components shown in applicant's figures. For example, torsion### spring 18 could be replaced by a leaf type spring and adjustment screws 19-21 could be of a different type. However, the principle of operation of the image plane adjustment mechanism would remain the same: three tangent### points define a plane against which the camera bracket 13 can be moved in pitch, roll and altitude so as to enable the image plane of camera 16 to be aligned to the image plane

of camera 17, which has a fixed position.

C. Distance Between Camera Adjustment

Referring to Figure 1, the base mounting plate 1, and gear mount dovetail slides 2 and 3 are designed with a "dovetail" slide design that permits the adjustment of the distance between the center of rotation of each worm gear 4 and 5, and accordingly, the center to center distance between the adjustable camera mounting bracket 11 and fixed camera mounting bracket 12, and thereby, the effective center to center distance of the example cameras 16 and 17. The average distance between human eyes is approximately 2.5 inches, and Applicant's preferred embodiment uses worm gears 4 and 5 with a diameter such that, when meshed with worm 8, the center to center distance is very close to 2.5 inches. If for some reason the center to center distance between the example cameras 16 and 17 needed to be changed, then the diameter of the worm gears 4 and 5 would be increased or decreased, thereby enabling a change in the center to center distance.

D. Location of Camera Nodal Point Adjustment

Referring to Figure 1, camera mount dovetail slides 9 and 10 provide the ability to individually move adjustable camera mounting bracket 11 and fixed camera mounting bracket 12 forwards and backwards. Referring to Figures 1 and 6, this possible motion permits the image "nodal" points 27 and 28 to be individually adjusted with respect to the center of rotation of worm gears 4 and 5, thereby enabling the image "nodal" points 27 and 28 for respective example cameras 16 and 17 to be

adjusted to the same position along the optical line of sight.

E. Summary

The present invention can be varied in many details of the mechanical design so as to accommodate different cameras, lens assemblies, electric motors (or manual drive) for the worm rotation, as well as to permit operation within specific environments, physical space requirements, and attachment of the subject two camera mount to
5 different tripods, gibbs, and other types of camera supports.

Although the description above contains many specificities, these should not be construed as limiting the scope of the invention, but merely as providing illustrations of the presently preferred embodiments of this invention.

CLAIMS

What is claimed is:

1. An apparatus for mounting two cameras for stereo graphic imaging with the capability to control the convergence of said two cameras, the capability to adjust the position of the image focal plane in one of said cameras with respect to the image focal plane in the other said camera, such that the two said cameras are correctly focused on the same image, the capability to adjust the spacing between the two cameras such as to mimic the average distance between human eyes, and the capability to adjust the two cameras such that the two cameras, while being converged, rotate around the same image (nodal) point, comprising:

(a) two gears, friction discs, or pulleys with a feature on the top surface for mounting a camera (collectively "gear"), each said gear mounted on a separate shaft and bearing assembly, the rotation of each said gear synchronized to the rotation of the other said gear, said gears able to rotate in either direction; and

(b) a gear, friction disc, or pulley mounted on a separate shaft and bearing assembly capable of simultaneously driving the synchronized rotation of the said gears ("gear driver"); and

(c) means for rotating said gear driver to cause the synchronized rotation of said gears in either direction, thereby enabling the convergence of said cameras to be

adjusted; and

(d) a non-adjustable mounting for one of said cameras affixed to one of the said gears such that when one of said cameras is attached to said non-adjustable mounting, said camera remains in a fixed position with respect to said gear; and

(e) an adjustable mounting for the other said camera affixed to the other said gear comprised of two brackets held together by three adjustable screws and a spring located centrally among said adjustable screws, said adjustable screws applying force opposite to said spring such as to keep said two brackets separated, but permitting the pitch, roll and distance between said two brackets to be adjusted by changing the relative length of said adjustable screws to each other; and

(f) means for turning said adjustable screws in said adjustable mounting such as to alter the pitch, roll and distance between said two brackets, thereby enabling the image focal plane of said camera mounted to said adjustable mounting to be aligned with the image focal plane of the other said camera mounted on the other said non-adjustable mounting; and

(g) two adjustable dovetail slides onto which said gears are mounted such as to permit the adjustment of the distance between the center of rotation of each said gear, thereby enabling the effective center to center distance between said cameras to be increased or decreased; and

(h) means for moving said adjustable dovetail slides onto which said gears are mounted as to permit the effective center to center distance between said cameras to

be increased or decreased; and

(i) two adjustable dovetail slides mounted on top of said gears such as to permit the adjustment of the forward or backward position (along the optical line of sight) of each said camera, thereby enabling the image (nodal) point of each said camera to be individually adjusted along its respective optical line of sight; and

5 (j) means for moving said adjustable dovetail slides on top of which said gears are mounted as to permit the adjustment of the forward or backward position (along the optical line of sight) of each said camera, thereby enabling the image "nodal" point of each said camera to be individually adjusted along its respective optical line of sight.

10 2. A method of controlling the convergence of two cameras comprising the steps of:

(a) providing two gears, friction discs, or pulleys with a feature on the top surface for mounting a camera (collectively "gear"), each said gear mounted on a separate shaft and bearing assembly, the rotation of each said gear synchronized to the rotation of the other said gear, said gears able to rotate in either direction; and

15 (b) providing a gear, friction disc, or pulley mounted on a separate shaft and bearing assembly capable of simultaneously driving the synchronized rotation of the said gears ("gear driver"); and

(c) providing means for rotating said gear driver to cause the synchronized rotation of said gears in either direction, thereby enabling the convergence of said cameras to be adjusted.

20

3. A method of aligning the image focal plane of two cameras comprising the steps of:

(a) providing a non-adjustable mounting for one of said cameras affixed to one of the said gears such that when one of said cameras is attached to said non-adjustable mounting, said camera remains in a fixed position with respect to said gear; and

5 (b) providing an adjustable mounting for the other said camera affixed to the other said gear comprised of two brackets held together at three points by adjustable screws with a spring located in the middle of said adjustable screws applying force opposite to said adjustable screws such to keep said two brackets separated, but permitting the pitch, roll and distance between said two brackets to be adjusted by turning said adjustable screws; and

10 (c) providing means for turning said adjustable screws in said adjustable mounting such as to alter the pitch, roll and distance between said two brackets, thereby enabling the image focal plane of said camera mounted to said adjustable mounting to be aligned with the image focal plane of the other said camera mounted on the other said non-adjustable mounting.

4. A method of adjusting the center to center distance between two cameras comprising the steps of:

(a) providing two adjustable dovetail slides onto which said gears are mounted such as to permit the adjustment of the distance between the center of rotation of each said gear, thereby enabling the effective center to center distance between said

cameras to be increased or decreased.

5. A method of adjusting the image (nodal) point of two cameras comprising the steps of:

(a) providing two adjustable dovetail slides mounted on top of said gears such as to permit the adjustment of the forward or backward position (along the optical line of sight) of each said camera, thereby enabling the image (nodal) point of each said camera to be individually adjusted along its respective optical line of sight.

5

ABSTRACT OF THE DISCLOSURE

An apparatus and method for holding two cameras on a single mount for stereo graphic imaging with controls for: (a) the synchronous convergence of the optical line of focus of both cameras at a single point at a desired distance; (b) the adjustment of the position of the image focal plane in one camera with respect to the image focal plane in the other camera such that the two cameras are correctly focused on the same image; (c) the adjustment of the spacing between the two cameras such as to mimic the average distance between human eyes; and (d) adjustment of the two cameras such that the two cameras, while being converged, rotate around the same image (nodal) point.

The primary benefits of the present invention are a compact mechanical configuration, simple and precise control of the optical convergence of two cameras, simple and precise alignment of the image plane in one camera with respect to the image plane in the second camera, simple adjustment of the distance between the cameras to mimic the distance between human eyes, and simple adjustment of the image (nodal) point around which the cameras are rotated for convergence.

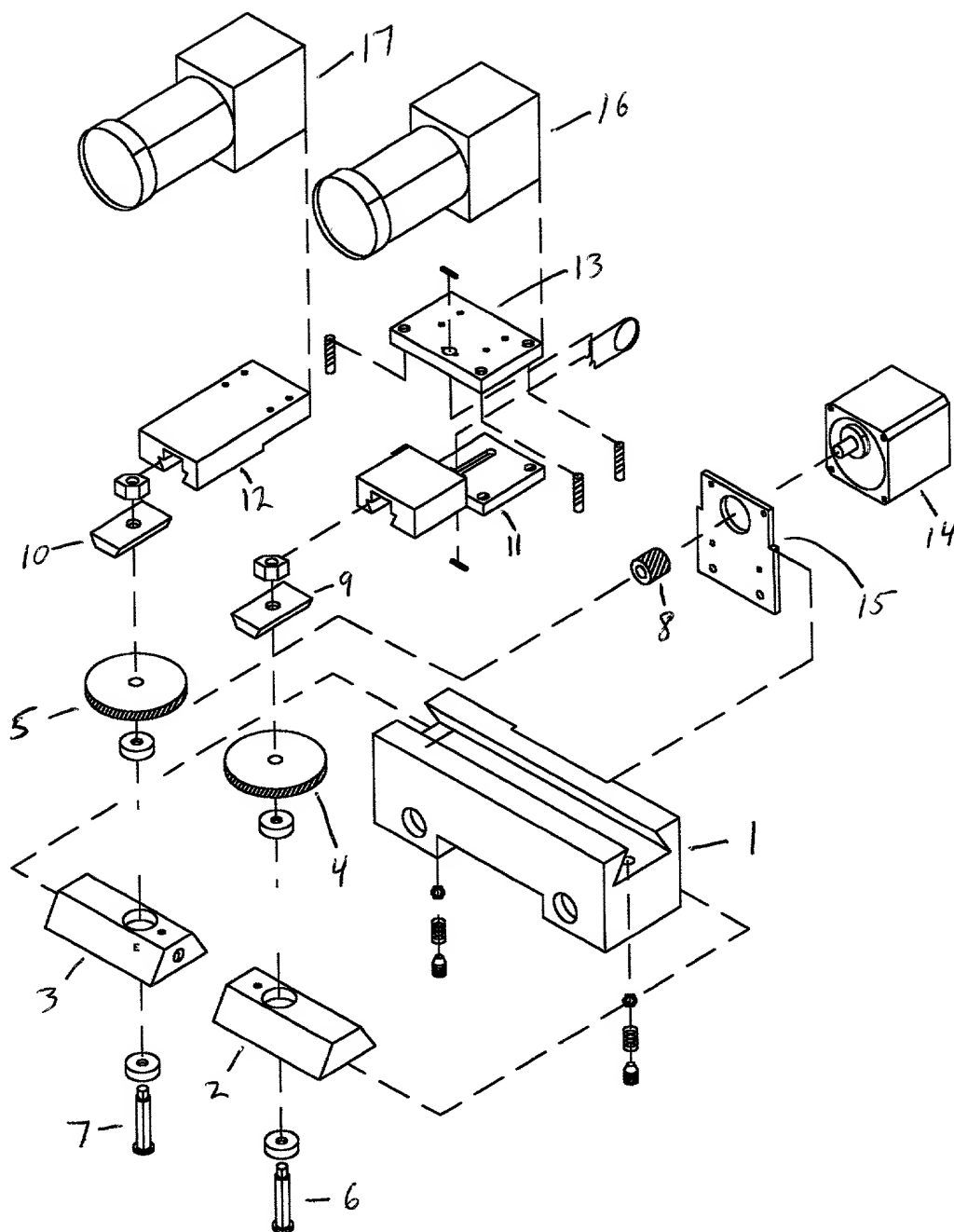


FIG. 1

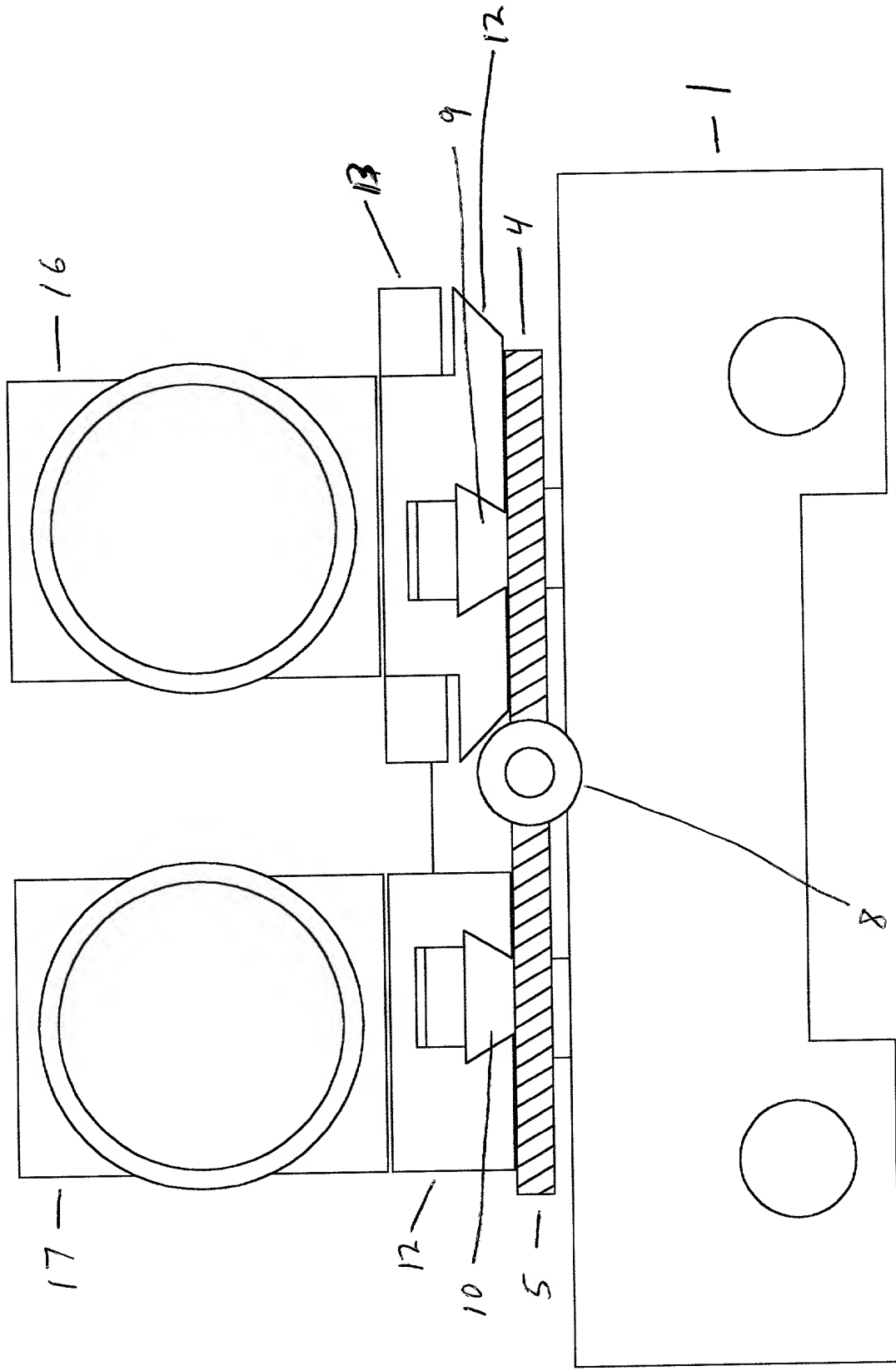


FIG. 2

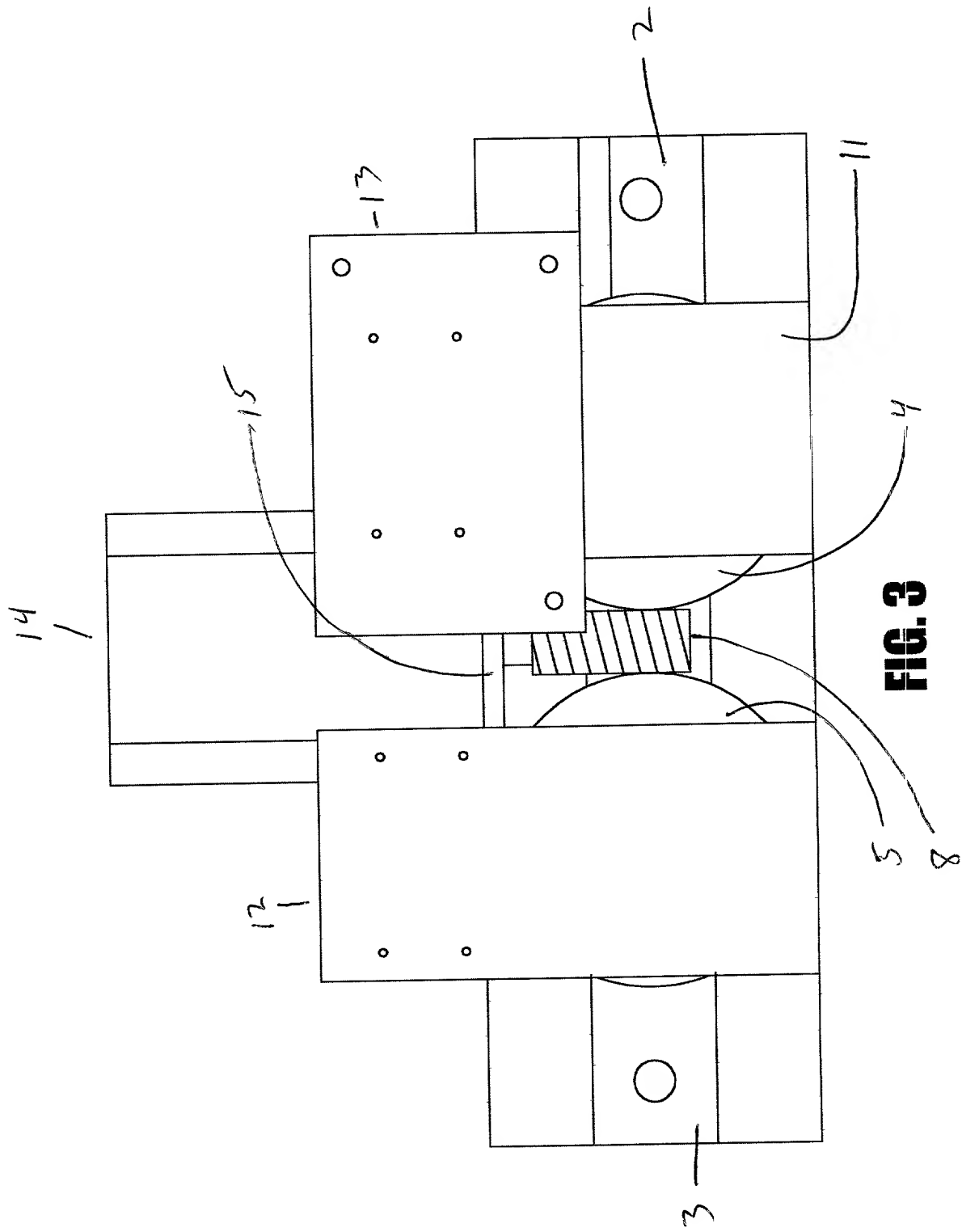


FIG. 3

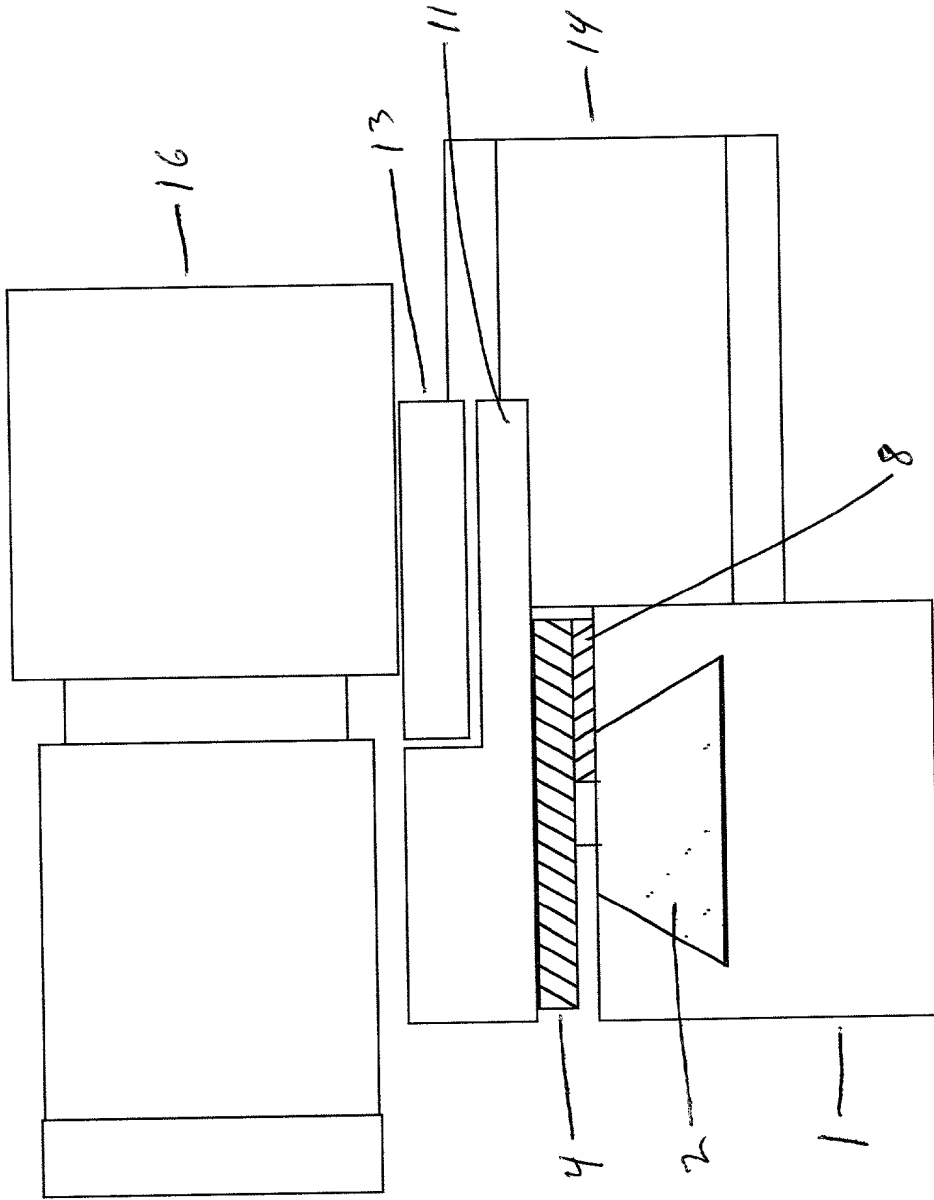


FIG. 4

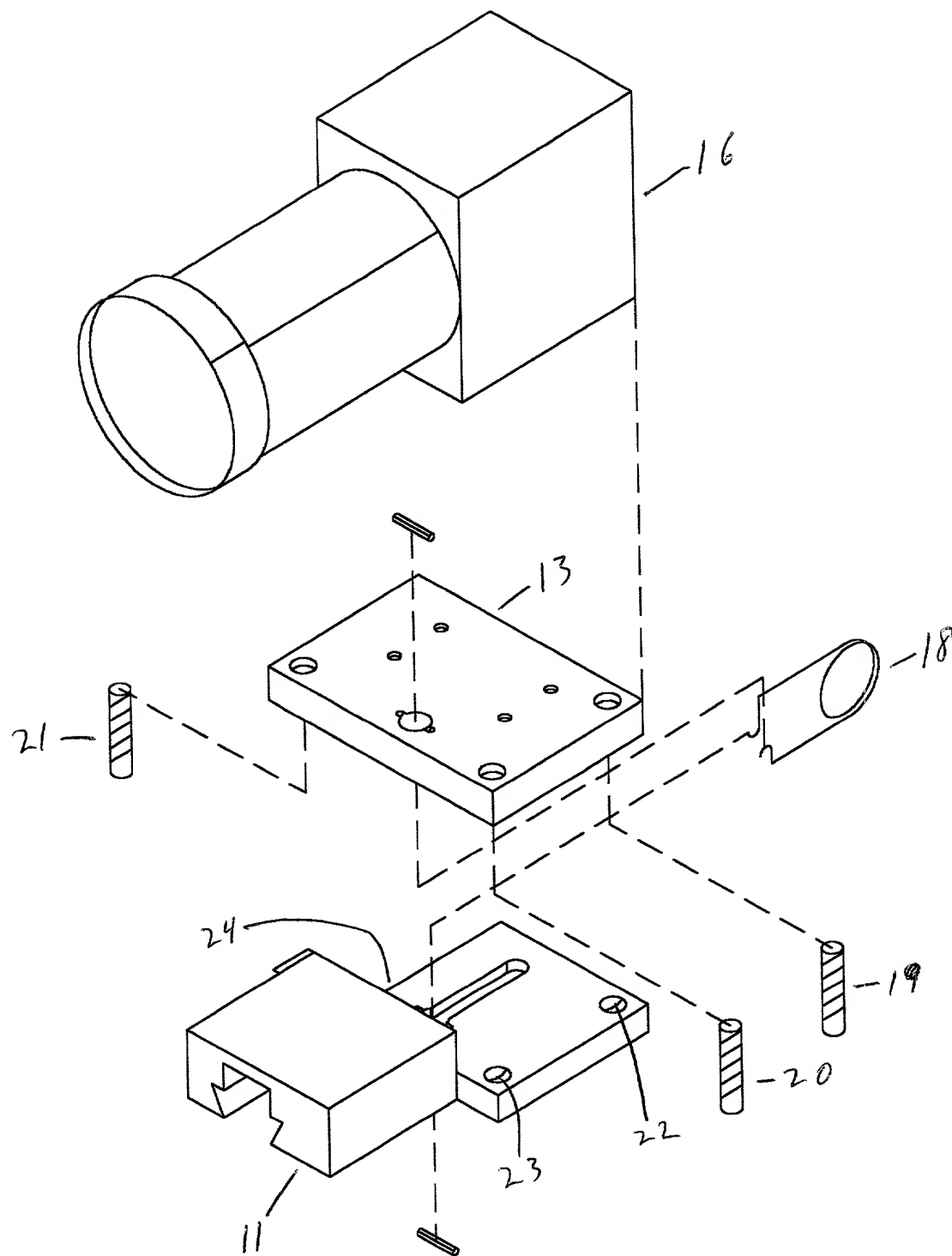
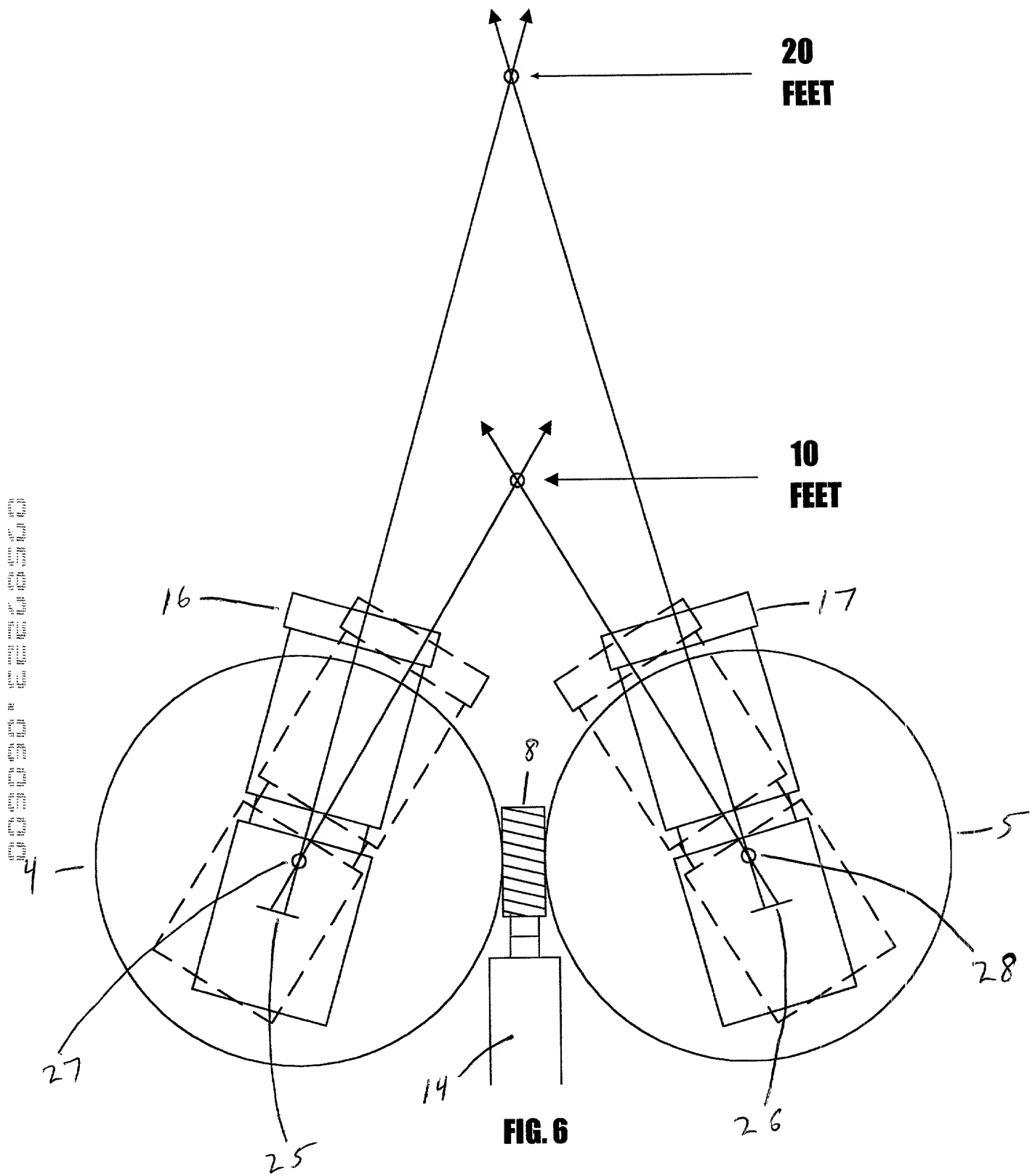


FIG. 5



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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)	Attorney Docket Number	QUA 1844.08A
	First Named Inventor	Patrick H. DWYER
	COMPLETE IF KNOWN	
	Application Number	/
	Filing Date	
	Group Art Unit	
<input checked="" type="checkbox"/> Declaration Submitted with Initial Filing	OR	<input type="checkbox"/> Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)
	Examiner Name	

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

DUAL CAMERA MOUNT FOR STEREO IMAGING

the specification of which (Title of the invention)

☒ is attached hereto

OR

☐ was filed on (MM/DD/YYYY) [] as United States Application Number or PCT International Application Number [] and was amended on (MM/DD/YYYY) [] (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)

☐ Additional provisional application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

[Page 1 of 2]

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DECLARATION — Utility or Design Patent Application

I hereby claim the benefit under 35 U.S.C. 120 of any United States application(s), or 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application or PCT Parent Number	Parent Filing Date (MM/DD/YYYY)	Parent Patent Number (if applicable)

☐ Additional U.S. or PCT international application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

As a named inventor, I hereby appoint the following registered practitioner(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

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☐ Registered practitioner(s) name/registration number listed below

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Number Bar Code
Label here

Name	Registration Number	Name	Registration Number

☐ Additional registered practitioner(s) named on supplemental Registered Practitioner Information sheet PTO/SB/02C attached hereto.

Direct all correspondence to: ☐ Customer Number OR ☒ Correspondence address below

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Address					
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name of Sole or First Inventor:

☐ A petition has been filed for this unsigned inventor

Given Name (first and middle (if any))		Family Name or Surname					
Patrick H.		Dwyer					
Inventor's Signature	Patrick H. Dwyer		Date	6/6/20			
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Post Office Address							
City	PENN VALLEY	State	CA	ZIP	95946	Country	US

☒ Additional inventors are being named on the 1 supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto

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DECLARATION

ADDITIONAL INVENTOR(S)
Supplemental Sheet
Page 1 of 1

Name of Additional Joint Inventor, if any:

☐ A petition has been filed for this unsigned inventor

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Family Name or Surname

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Southam

Inventor's
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Gordon R. Southam

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Inventor's
Signature

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Residence: City

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Name of Additional Joint Inventor, if any:

☐ A petition has been filed for this unsigned inventor

Given Name (first and middle [if any])

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